# Symptoms of cranio-mandible dysfunction or bruxism among students

## (Objawy dysfunkcji czaszkowo- żuchwowej lub bruksizmu wśród studentów)

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***Abstract*** – Introduction. Nowadays, there is a clear increase in the incidence of functional disorders of the stomatognathic system. This is probably related to the growing need to care for your health, but it also may result from a real increase in the incidence of this pathology. High relevance of the issues, prompted the authors to undertake their own research.

Aim of the study. The aim of the study was to assess the frequency of the occurrence of bruxism symptoms among students of Krakow's universities.

Material and methods. The study group consisted of 277 people (172 women and 105 men) aged 19 – 29 who were students of Krakow's universities. An original questionnaire was used and a short physical examination was carried out.

Results and conclusions. The most frequently felt ailment among the subjects was headache. It was reported by 80% of respondents, followed by a disturbed mandibular movement pathway, which was recorded in 78% of respondents, cracks in the tempo-ro-mandibular joint, which were given by 50% of subjects: presence of tooth clashes and lack of symmetry of masseter muscles, which were found at the same frequency in 38 % of respondents. Tinnitus related to 22.74% of the subjects. A disturbed mandibular disorder pathway occurred in 77.98% of patients with masticatory system dysfunction.

***Key words*** - symptoms of masticatory dysfunction, students.

***Streszczenie*** – Wstęp. Współcześnie odnotowuje się wyraźny wzrost częstości występowania zaburzeń czynnościowych układu stomatognatycznego. Ma to zapewne związek ze wrastająca potrzebą dbałości o swoje zdrowie, ale także może wynikać z rzeczywistego wzrostu częstości występowania tej patologii. Duża aktualność problematyki skłoniła autorów do podjęcia badań własnych.

Cel pracy. Celem badań była ocena częstości występowanie objawów bruksizmu wśród studentów krakowskich uczelni wyższych.

Materiał i metody. Grupę badaną stanowiło 277 osób (172 kobiety i 105 mężczyzn) w wieku 19 - 29 lat, studentów krakowskich uczelni. Wykorzystano autorską ankietę oraz przeprowadzono krótkie badanie fizykalne.

Wyniki i wnioski. Najczęściej odczuwaną dolegliwością wśród badanych był *ból głowy*. Zgłaszało go 80% respondentów, następnie *zaburzony tor ruchu odwodzenia żuchwy,* który rejestrowano u 78% badanych, *trzaski w stawie skroniowo- żuchwowym*, które podawało 50% badanych: *obecność starć zębów* i *brak symetrii napięcia mięśni żwaczy* , które stwierdzano z jednakową częstością u 38% badanych. Szumy uszne dotyczyły 22,74% badanych. Zaburzony tor odwodzenia żuchwy występował u 77,98% chorych z dysfuncją narządu żucia .

Wnioski. Jednym z wiodących , choć niecharakterystycznych objawów dysfuncji narządu żucia jest ból.

Chorym z zaburzeniami układu stomatognatycznego towarzyszyć mogą różnorodne objawy otologiczne występujące w dużym przedziale częstości.

***Słowa kluczowe*** - objawy dysfuncji narządu żucia, studenci.

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B. Gathering and listing data
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## I. INTRODUCTION

Nowadays, there is a clear increase in the frequency of functional disorders of the stomatognathic system. This is probably related to the growing need to care for your health, but it may also result from a real increase in the incidence of this pathology. [1-7] It is estimated that in the last twenty years in Poland, the number of patients with masticatory dysfunctions doubled. [1]. These dysfunctions occupy the third place in the group of the most common oral pathologies, giving way to caries and periodontal diseases. [4] Depending on the criteria used, it is estimated that approximately 80-80% of adults affect 75% of adults and up to 75% of adolescents aged 15-17 [1.7-9].
The aim of the study was to assess the frequency of the occurrence of bruxism symptoms among students of Kraków's universities.

## II. MATERIALS AND METHODS

*Materials*

The survey was conducted from March 1 to May 31, 2014 in Krakow. The studied group comprised 277 students of four Cracow universities: Collegium Medicum of the Jagiellonian University, AGH University of Science and Technology Stanisława Staszica, Cracow University of Technology Tadeusz Kościuszko and the Pedagogical University named after National Education Commission (Rectors of Cracow universities were obtained for research). Universities were represented in the study respectively by 66 (Collegium Medicum of the Jagiellonian University), 69 (AGH University of Science and Technology), 74 (Cracow University of Technology) and 68 (Pedagogical University) students. 62% (172 people) of the study group were women. The subjects were aged from 19 to 29 years.

*Methods*

The survey was voluntary, anonymous and random. It used an original questionnaire containing questions about age, sex, year and field of study and questions about the occurrence of physical symptoms such as: headache, jaw pain, cracks in the temporomandibular joint, tinnitus, tooth fracture for an unclear reason, waking up at night. The subject determined the frequency of occurrence of a given symptom.

The questions concerned the occurrence of various parafunctions, for example: chewing gum, chewing pens - the subject marked the frequency of practicing the paraffin.
In the question assessing susceptibility to stress, the subject had to mark the answer, which according to him best describes his reactions to stressful situations.

The respondent was also assessed by asking questions whether he was a hyperactive person. As an explanation of this term, it is stated that hyperactivity occurs when a person is unable to sit for one full hour without changing his position or performing additional movements.
Another behavior that was asked in the survey was practicing sports, the respondent reported what sports he was practising and how many hours in a week he spent on physical activity.

The further part of the questionnaire concerned the method of feeding in early childhood, the researcher indicated whether he was fed naturally (breast) or by a bottle (there was an answer "I do not know" until the election).
Immediately after the survey a physical examination was carried out. The masseter muscle tension on the trailers and belly was checked - the symmetrical pressure of the muscle attachment sites and the muscular thigh was used. The subject valued his feeling and gave it weight in the ten-point VAS scale. The masseter muscle tension was examined using the VAS scale to record the results. For the purpose of the analysis, the examined students were divided according to the reported muscle tone of the masseter into 3 groups: low voltage (1-4 on the VAS scale), medium (5-6) and high (7-10).

The range of abduction of the mandible was measured using a 3-finger test; the examined person checked if he was able to open his mouth to such a width as to fit his own 3 fingers (index, middle and ring finger) between the edges of the lower and upper arch teeth. To ensure hygiene during this test, the patient was instructed to use disinfectant.
Then the subject assessed the occurrence of inequalities and swellings on the mucous membrane of the cheeks. He independently checked the inside of the cheeks with his

tongue, giving the examiner whether these swellings are present.

Another symptom that was checked in the study was hypermobility - passive thumb pull to the forearm was used. The result was considered positive if the subject managed to touch the forearm with the thumb.

The researcher then assessed the tooth abrasion by comparing the height of the upper canines relative to the upper lateral incisors. If on one side there was an alignment of the height of the canine with the side incisor, a positive sign of clash was considered.

The mandibular abduction pathway was also examined, the subject performed several abortions, giving the examiner the opportunity to assess the course of the stereotypical trajectory. Any non-straight track was treated as a disorder.

Often one of the subjects presented several types of the abduction track, which is why the movement was repeated several times, which allowed to clearly determine how the typical diversion track is going for a given patient. The result of this test was marked on the Farrar diagram.

## III. RESULTS

The occurrence of symptoms of cranio-mandibular dysfunction or bruxism

The incidence of symptoms of cranio-mandible dysfunction or bruxism among the analyzed group of students is presented in Table 1.

Table 1. The incidence of symptoms of cranio-mandible dysfunction or bruxism in the study group

| Symptom | | Occurence |
|---|---|---|
| Headache | 221 | 79,78% |
| Jaw pain felt after waking up | 44 | 15,88% |
| Cracks in the temporomandibular joint | 138 | 49,82% |
| Tinnitus | 63 | 22,74% |
| Hyperactivity | 24 | 8,66% |
| Breaking a tooth without a clear cause | 24 | 8,66% |
| Nocturnal awakening | 77 | 27,80% |
| Hypermobility | 100 | 36,10% |
| Convergence disorder | 44 | 15,88% |
| Increased masseter tone: right eye / left eye | 96/91 | 34,66%/32,85% |
| No symmetry of the masseter muscles tension | 105 | 37,91% |
| Limited movement of abduction of the mandible | 8 | 2,89% |
| Disturbed mandibular movement path | 216 | 77,98% |
| The presence of swellings on the cheeks | 97 | 35,02% |
| Tooth ablasion | 105 | 37,91% |

In the group of symptoms presented in Table 1, there is no difference in the symptoms of craniofacial dysfunction or bruxism, as well as tooth abrasion.

The most felt ailment among the subjects was headache. It was reported by 80% of respondents, which was recorded in 100% of respondents, cracks in the temporo-mandibular joint; symmetry of masseter muscles, which were found at 38% of respondents.

The incidence of pain in the study group is shown in Table 2

Table 2. Distribution of the occurrence of the study group

| Frequency of headaches | Number | % |
|---|---|---|
| everyday | 2 | 0,72 |
| 3-5 days in a week | 14 | 5,05 |
| 1-2 days in a week | 53 | 19,13 |
| 1 in a month | 128 | 46,21 |
| never | 56 | 20,22 |
| other [1] | 24 | 8,66 |
| **Altogether** | **277** | **100,00** |

1 / In the "other" category there is a frequency of less than 1 per month, as well as pains that the subjects directly connect to a specific situation (e.g. alcohol consumption), and pain occurring irregularly and sporadically.

The presented data show that headaches in 46.21% of subjects were reported once a month, in 19.13% they occurred with a frequency of 1-2 times a week. Other periodicals of headache were definitely less frequent.

The distribution of the frequency of occurrence of cracks in the temporomandibular joint in the studied group is presented in Table 3.

Table 3. The occurrence of cracks in the temporomandibular joint in the study group

| The frequency of occurrence of cracks in the temporomandibular joint | Number | % |
|---|---|---|
| often | 31 | 11,19 |
| seldom | 107 | 38,63 |
| never | 139 | 50,18 |
| **Altogether** | **277** | **100,00** |

Cracks in the temporomandibular joint occurring during the chewing activity were observed by 49.72% of students, with 11.19% of them finding that they occur frequently.

The distribution of tinnitus frequency in the study group is shown in Table 4.

Table 4. Distribution of occurrence of tinnitus in the study group

| Presence of tinnitus | Number | % |
|---|---|---|
| every few days | 5 | 1,81 |
| every few hours | 3 | 1,08 |
| several times a week | 55 | 19,86 |
| never | 214 | 77,26 |
| **Altogether** | **77** | **100,00** |

22.74% of the surveyed students confirmed tinnitus, 19.86% were of the opinion that these symptoms occur several times a week, other symptoms were much less frequent.

The distribution of nocturnal awakenings in the study group is presented in Table 5.

Table 5. Occurrence of nocturnal awakenings in the study group by frequency

| Frequency of awakenings | Number | % |
|---|---|---|
| 1-2/ night | 13 | 4,69 |
| 1/ night | 10 | 3,61 |
| 2-5/ week | 17 | 6,14 |
| 1/ week | 4 | 1,44 |
| 2-4/ month | 10 | 3,61 |
| 1-2/ month | 23 | 8,30 |
| none | 200 | 72,20% |
| **Altogether** | **277** | **100,00** |

27.80% of respondents admitted to waking up at night. Nocturnal awakenings occurred most frequently (8.3% of respondents) once or twice in a month, in 6.14%: 2-5 awakenings per week, and in 4.69%: 1-2 every night.
The distribution of prevalence of convergence disorders in the study group is presented in Table 6.

Table 6. Occurrence of convergence disorders in a group of students

| Convergence disorder | Number | % |
|---|---|---|
| convergence is correct | 233 | 84,12 |
| convergence disturbed only in the left eye | 25 | 9,03 |
| convergence disturbed only in the right eye | 6 | 2,17 |
| convergence disturbed in both eyes | 13 | 4,69 |
| **Altogether** | **277** | **100,00** |

Convergence disorders affecting at least one eye occurred in 15.88% of subjects, with the most common (9.03% of students) in the left eye.

The distribution of masseter muscle tone in the study group is shown in Table 7.

Table 7. Distribution of masseter muscles tension in the study group

| Tension of the masseter muscles | Right | | Left | |
|---|---|---|---|---|
| | Number | % | Number | % |
| high | 34 | 12,27 | 27 | 9,75 |
| average | 62 | 22,38 | 64 | 23,10 |
| low | 181 | 65,34 | 186 | 67,15 |
| **Altogether** | **277** | **100,00** | **277** | **100,00** |

The lowest frequency of masseter muscles was recorded in the subjects, 65.34% for the right eye and 67.15% for the left eye. Also, the average muscle tone of the masseter occurred symmetrically with the similar frequency (for the right eye: in 22.38% of cases, for the left eye: in 23.10% of cases). The intensity of masseter muscle tension did not show statistically significant differences between the right and left eyes.
The occurrence of asymmetry in the masseter muscles tension in the examined group is presented in Table 8.

Table 8. The division of students into groups due to the occurrence of asymmetry in the tension of masseter muscles

| The occurrence of asymmetry in the strain of masseter muscles | Number | % |
|---|---|---|
| Full symmetry | 172 | 62,09 |
| 1 or 2 | 89 | 32,13 |
| 3 or 4 | 12 | 4,33 |
| 5 or 6 | 2 | 0,72 |
| 7and more | 2 | 0,72 |
| **Altogether** | **277** | **100,00** |

The asymmetry in masseter muscle tension was noted in 37.91% of the subjects, with asymmetry 1 or 2 being the most frequent in 3213 students.

The restriction of mandibular abduction movement concerns 2.89% of respondents, whereas the disorder of this movement was found in 77.98% of them. Five types of thoracic abduction were distinguished from the results of the tests carried out. The graphical type is presented in Figure 1. One more rare type was observed, which cannot be presented unambiguously, because it is a combination of several arcs in different directions, often with crossing the midline of the body.

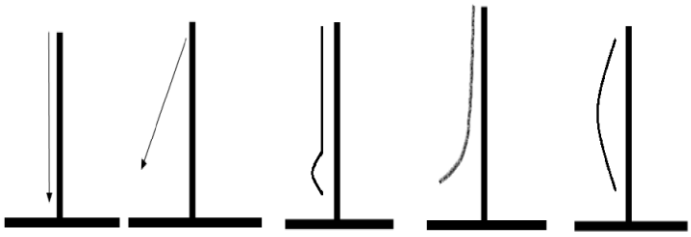

Figure 1. Presentations of tracks for the movement of mandibular abduction

Ablasion of fangs was detected in 37.91%, while the presence of swellings and irregularities on the cheeks in 35.02% of the respondents.

Table 9. Prevalence of selected symptoms of cranio-mandible dysfunction or bruxism in the studies of various authors

| Authors | Sójka A., Hędzelek W. [27] | Nawrocka- Furmanek i wsp. [38] | Litko M. Kleinrok J.[1] | Badania własne |
|---|---|---|---|---|
| **Respondent's age** | 20-25 | 19-25 | Children and teenagers | 19-29 |
| **The size of the studied group** | 30 | 264 | Literature review | 277 |
| **Teeth ablasion** | 60% | The relationship between the pathological clash and the symptoms of masticatory dysfunction was not found | Not included | 38% |
| **Increased muscle tone of the masticatory** | 76% | The relationship between the back of the bite and the soreness of the cheek | Relationship of muscle tension with execution parafunctions | 65% |
| **Acoustic symptoms** | 56% | More often in the group with nieprawidościami tooth | Not studied | 50% of respondents, more often occur with noise tinnitus |
| **Orthodontic treament** | Not studied | There was no correlation with the occurrence of symptoms of masticatory organ dysfunction | The authors pay attention to the iatrogenic pain syndromes of the masticatory system occurring after orthodontic treatment | 46% in past or present. No there were found dependencies with the occurrence of symptoms of masticatory organ dysfunction |

## IV. DISCUSSION

It is widely emphasized that one of the leading, though non-characteristic symptoms of masticatory system dysfunction is pain. This type of discomfort is referred to as myofacial pain or maxillo-facial pain (maxillofacial pain). Its origin is interpreted differently. It indicates the in-

volvement of impaired functions of the masticatory system, the joint or muscular background of the ailments involved, as well as the involvement of vascular diseases, neurological and psychiatric disorders, and systemic disorders in the formation of this type of discomfort. The pain may be accompanied by local warming, intensifying when changing the position of the masticatory system. Muscle pain is usually constant, dull, diffuse, and increases with increased muscular activity of the masticatory organ. Probably this type of discomfort is a consequence of irritation of nerve endings with local metabolites formed as a result of muscle work and irritation of perivascular plexuses of contracting muscles. [10-21]

Nowadays, each of us is subjected to the activity of numerous stressors. The consequence of emerging stressful situations is the prolonged stimulation of the limbic system and, as a result, the contraction of the masticatory muscles. This promotes self-destruction and the growth of pathology of the masticatory organ. It comes to excessive teeth ablasion, vertical cracking within tooth enamel, lowering of the height of the shorting, hyperfunction of the masticatory muscle muscles. [22-25]

Excessive tooth ablasion is a relatively common symptom of masticatory system dysfunction. According to Maciejewska-Szaniec data, this symptom is accompanied by the dysfunction of the masticatory system from 29.41 to 93.55% of cases, depending on the selection of the analyzed group. [26]

The result of 37.91% obtained by us is therefore, in the cited range. In turn, Sójka and Hędzelek [27] when analyzing a group of 30 students observed that teeth ablasion was experienced by 60% of the respondents. The discrepancy between our data and the results of other authors may result in the adopted assessment criteria. The results obtained by us may also be influenced by the fact that only fangs were checked in our study, while in our assessment, for example, Sójka and Hędzelek considered all teeth.

Patients with disorders of the stomatognathic system may be accompanied by various otological symptoms. These include tinnitus, feeling of blockage, ear and pre-bursal hearing, temporary or even permanent hearing loss. According to literature data, they occur at a frequency of 2.0-82,4%. [28-31]

In Maciejewska-Szaniec studies, otological symptoms were present in 31.69% of patients with masticatory dysfunction [26]. According to our findings, tinnitus refers to 22.74% of respondents. In contrast, Michalak et al. reported otological symptoms in 33.38% [32].

In turn, the aforementioned Sójka and Hędzelek found that the occurrence of acoustic symptoms were identified in 56% of the respondents. The occurrence of tinnitus is variously translated. Attention was paid to the possibility of oppression of the bone elements on the anatomy / temporal nerve, vein and anterior tympanic artery as well as on the external auditory canal and the auditory trumpet, which would cause disturbances of blood supply, innervation and hearing organ function [33.34].

This type of ailment was also associated with direct mechanical stimulation of the hammer, through its connection with the structures of the temporomandibular joint (otomandibular ligate of hypotesis) [35]

Myrhaug emphasized that the common nerves of the muscles of the trigeminal nerve are the basis of aural problems: the tension of the palate, tympanic membrane and masseter muscles. [36]

Ear problems were also associated with the contraction of the blood vessels supplying the ear receptor. Nowadays it is more and more often emphasized that otological complaints in patients with mastectar dysfunction may be associated with irritation of the trigeminal nerve.

According to our findings, the disturbed mandibular abdomen is present in 77.98% of patients with masticatory dysfunction. Sójka and Hędzelek, in a similar to our age group found that the occurrence of mandibular yawning was detected in 70% of respondents. In turn, Maciejewska-Szaniec [26] is of the opinion that this symptom may concern from 8.69% to 68% of patients depending on the selection of the influenza under investigation.

However, it should be remembered that functional disorders of the masticatory system may also be accompanied by, for example, rheumatoid arthritis, limiting facial mobility / and jaw swelling, pain during abduction and palpation of the stomatognathic system muscles, Parkinson's disease, evoking mandibular shaking, difficulty in chewing, cerebral stroke causing unilateral paresis, difficulty in chewing and swallowing). [37]

However, the authors' results presented in Table 9 show the existence of a large discrepancy in the literature data on comparable age groups.

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